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ABSTRACT

This paper discusses the future role of technology in arts education and addresses the impact of technology on teaching and learning in these content areas. The following topics are covered: (1) technology in arts education; (2) the link between learning and technology; (3) change in goals and purpose in arts education--curriculum, instruction, and assessment; (4) goals and standards for music, theater, visual arts, and dance; (5) professional development--support for improving educational outcomes; (6) technology's impact on teaching and learning in arts education; (7) improving educational outcomes; (8) connections to other schools, higher education, businesses, and communities; and (9) caution concerning technology's use. (MES)

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THE FUTURE OF TECHNOLOGY IN K-12 ARTS EDUCATION

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INTRODUCTION AND PURPOSE

While educators may legitimately debate strategies and methods of education, all agree that participation in the world of the 21st century will demand technology competence. The use of technology is essential in teaching communications, mathematics and science. It is no less important in the arts. Currently in American education, we are experiencing a shift in goals and strategies from teaching the basics to using vast amounts of information. Now more than ever, this change requires students to use technology to solve problems, make meaningful decisions and think creatively. Instead of just learning discrete and isolated facts, students need to acquire skills for applying information whatever the subject matter.

We know that technology is an important tool that can improve our educational system, but today we face the challenge of integrating technology into the delivery of content. Our effective use of technology in the educational process will shift our instructional content from data and information to useful knowledge. It will be an opportunity for students and teachers to access, analyze and apply information—to create new ideas by giving functionality to facts. Digital technologies in all content areas can enhance student achievement by addressing introductory and advanced skills, assessment of student progress and student motivation.

Arts education means using the aesthetic symbols of music, theatre, visual arts and dance to give our humanity form and meaning. Music uses notes, theatre storytelling, the visual arts images, and dance body movement. Technology as a tool can assist students and teachers as they incorporate overwhelming amounts of information related to these symbol systems. They are thus able to create, perform and respond to the arts. Each of these disciplines specializes in applied communications skills that are so important to the workforce of today.

The purpose of this white paper is to discuss the future role of technology in arts education and address the impact technology has on teaching and learning in these content areas. It will begin with an overview of the goals and national standards for music, theatre, the visual arts and dance. Additionally, the paper will discuss integrating technology into the curriculum, instruction and assessment of these disciplines. This is important, since to test our vision for the future, we must review the collective wisdom of the past. Finally, the paper will address the issues educators need to consider in making technology part of arts education.

TECHNOLOGY IN ARTS EDUCATION

Technology in K-12 arts education can be thought of as applied science (anything that uses science to achieve a desired result). It is an extension of a person's capabilities as well as a way of expanding his/her ability to learn. In the past evolving technology has always played an important part in the historical development of the arts. Technology has provided the tools, processes, and materials that assist artists in their creative expression. For example, the record

player in music and the camera in visual arts are instances in which technology changed people's understanding of art.

The arts are crucial components of the K-12 curriculum and require serious study. Music, theatre, the visual arts and dance are basic means of communications. They develop higher order thinking skills while engaging students in a variety of learning styles. These unique experiences integrate learning with other content areas by showing connections. The arts develop discipline while preparing students for their adult lives. Arts education enables students to acquire aesthetic judgment which affects both individual and group decisions about our society. Students who experience the arts are able to solve problems, make meaningful decisions and think creatively.

While recognized as essential fields of learning in and of themselves, the arts provide significant opportunities for critical thinking, creative problem solving, collaborative learning and community involvement. These interpersonal skills are supported by the findings outlined in the SCANS report (Secretary's Commission on Achieving Necessary Skills-1992) as necessary for the jobs for the future. In addition, the arts provide knowledge of our own cultural heritage and teach us about other cultures both past and present. Moreover, the arts invite students to address fundamental issues such as values, feelings, ethics, standards and social concerns. Mastery of communication skills can be demonstrated through music, theatre, the visual arts and dance.

Now the potential of digital technologies, specifically computers, video and telecommunications have the same power to redefine students' creative expression and understanding of the arts. The applications of these and future technologies will not only redefine what constitutes art, but they should be an essential part of the evolving K-12 curriculum. These newer digital technologies related to the arts force students to be active participants in the learning and creation of the arts disciplines; therefore, it is imperative that arts educators develop a philosophy and incorporate technology with the learning process. Teachers need to create new learning opportunities not just automate the existing curriculum.

Educational technology has three major contributions to make to teaching and learning. First, the use of technology can accelerate the learning in the arts. Students studying music are able to compose their own arrangements and compositions. They can perform a passage on a MIDI keyboard into a notation program. The computer will notate their performance and then the students can compare the notated performance to the original. Also the notation software provides a tool for students to create and print out music. A printed piece of music is a tangible outcome that can be used for assessment.

Secondly, technology can access more information related to any topic. Students and arts specialists using the Internet or distance learning can access the major museums as well as conduct research for specialized articles on art criticism or aesthetic valuing. Many of these experiences incorporate interactive media that engages the learner.

Finally, the Internet can serve as a method of multiple communications among numerous individuals, organizations and communities involved in the arts. Teachers can communicate with thousands of other teachers for discussions about the arts, share lesson plans and organize collaborative learning experiences. It can ameliorate problems like teacher isolation.

At the same time arts specialists must develop personal perspectives on the current and future role of technology in education. They need to determine which electronic tools are appropriate for given classroom situations. In turn, the technology tools will empower them to teach more effectively and use their time more efficiently. Integrating technology with the content disciplines also improves teaching skills and classroom management.

The International Society for Technology in Education's (ISTE) teacher standards established in 1992 address the technology needs for educators. The three areas that teachers need to master are 1) basic computers/technology concepts, 2) personal/professional use and 3) applications in instruction. The National Council for Accreditation of Teacher Education (NCATE) modified these very same concepts in 1995 as proposed technology standards for teachers. According to NCATE, teacher preparation programs are expected to include experiences with educational technology integrated with instruction and assessment. Many of our institutions of higher learning are currently challenged with meeting these standards as they prepare preservice teachers for the teaching profession. Mastering these concepts with meaningful curriculum and instruction is beginning to be a part of the preservice program for prospective arts educators.

Link Between Learning and Technology

Howard Gardner's theory of multiple intelligences gives meaning to educators as they define the K-12 curriculum. He believes the purpose of school is to help students grow in all seven intelligences. Teachers need to develop the musical, spatial, bodily kinesthetic, intrapersonal and interpersonal intelligences of their students. These five intelligences must be added to the linguistic and mathematical intelligences already emphasized in American education. This understanding of developing all seven intelligences has powerful implications for instruction and assessment regarding individual and differential development for students and arts education (Gardner, 1983).

As the goals of education change to reflect the new educational needs of our society, so do the strategies for technology integration. It is the belief of our time that the purpose of education today is to prepare students with critical thinking skills for a complex world as well as produce lifelong learning. Learning theorists have created two very different theories for achieving today's educational goals.

One view, ***directed instruction***, focuses on teaching sequences of skills that begin with lower-level and build to higher-level skills. The objectives clearly match with the test items while emphasizing more traditional teaching and assessment methods. Educators stress individualized work rather than group work. Examples of this method are lectures, skill worksheets, activities and tests with specific expected responses. Technology applications under this method are drill and practice and tutorials.

The other strategy, the ***constructivist model,*** focuses on learning through posing problems, exploring possible answers and developing products. This method incorporates problem solving and research skills while stressing group work more than individualized work. It is learner centered in its approach. Examples of the constructivist model contain open-ended questions, research, product/performances and assessment.

Multimedia and telecommunications applications can apply to either the directed teaching method or the constructivist model depending how the arts specialists choose to integrate the digital technologies. Arts educators will determine the instructional need and then identify the technology integration strategy. By combining directed and constructivist activities involving technology and arts education, the teachers will be delivering a more useful curriculum (Roblyer, Edwards and Havriluk, 1997)

Change in the Goals and Purposes in Arts Education-Curriculum, Instruction and Assessment

Educators want all students to be able to solve problems, make meaningful decisions, and think creatively. At the same time the goals for arts education must support the best characteristics of quality learning with the latest advances in learning theory and interactive technologies. Arts educators want to teach students how to locate, access, and apply information in all disciplines.

No longer is exposure to the arts sufficient; the visual and performing arts require serious study. The arts in public schools are not just about drawing turkeys at Thanksgiving, learning musical compositions for band competition, reciting lines from Shakespeare or performing folk dances in PE. Instruction in each of the disciplines relies on a sequential curriculum with clearly specified outcomes. The teachers must utilize national and state standards as their measure and incorporate instructional and assessment components in their delivery. Integrating the arts with technology is most important in this information age. By introducing new digital technologies teachers are exposing students to new arts media.

Technology can assist teachers in rethinking their instructional process. Methods of instruction are changing as we integrate the technology with the arts. Arts specialists in each of the disciplines assist students with defining problems, searching and retrieving information and

coaching for presentation or performance. By integrating technology with the content, arts specialists can customize instruction enabling students to reach their potential. Very often instruction becomes more interesting because it is interactive.

Arts teachers need to assess the content and instructional delivery of the learning. The key to assessment lies in the curriculum design. It must be created to achieve clearly defined objectives based on skills and knowledge, not on vague feelings, emotion or effort. The arts are performance based and can be judged by measuring the different objectives in music, theatre, the visual arts and dance. Portfolio collections as well as paper and pencil tests will tell how the students mastered the content. Students and arts specialists are held accountable by their communities for meeting national and state approved achievement standards for the arts. Evaluation is important because the public will fund successful programs.

GOALS AND STANDARDS

In **A Nation at Risk** (1983) the Carnegie Foundation discussed many changes necessary to improve America's approach to our educational system. One of the suggestions was to integrate technology with the teaching and learning process. In **Goals 2000: Educate America Act** (1994) the United States identified the arts as one of 9 areas where students needed to demonstrate competency. As part of this action, national standards for the arts were created as well as thoughts about integrating technology with the content areas. It was at this same time that Secretary of Education, Richard Riley, created a National Long-Range Technology Plan to strengthen the role of technology in school reform.

Today technology is already making structural changes in our educational system. Teachers, administrators, and content specialists in music, theatre, the visual arts and dance have been addressing changes to curriculum/content, the physical learning environment as well as the changing roles of teachers. The professional organizations for each of the arts disciplines and some state departments of education have created desired goals and standards to guide curriculum. Yet it is important to note that a major finding in the NAEP 1997 Arts Report Card reported that most schools in the NAEP study followed a district or school curriculum for music and visual arts but not for theatre and dance.

MUSIC

The Music Educators National Conference (MENC) created nine national standards:

1. Singing, alone and performing with other, a varied repertoire of music.
2. Performing on instruments, alone and with others, a varied repertoire of music.
3. Improving melodies, harmonies and accompaniments.
4. Composing and arranging music within specified guidelines.
5. Reading and notating music.

6. Listening to, analyzing and describing music.
7. Evaluating music and music performances.
8. Understanding relationships between music, the other arts, and disciplines outside the arts.
9. Understanding music in relation to history and culture. (1994)

Standards 1-5 focus on skills related to creating or performing music, and 6-9 are objectives related to responding to music. Technology can be used in each of the areas once the music teachers build their instruction upon national and state standards as a guide. At the same time the music specialists must decide how technology can best serve the desired outcomes. For example, electronic keyboards are being used as classroom instruments and the computers are creating and composing music in many music classrooms today (Rudolph, 1996).

THEATRE

Related to the K-12 curriculum, drama education includes theatre experiences ranging from informal role-playing and improvisation to plays for an audience on a school stage. While drama has a limited presence in educational programs in public education, it is an exciting opportunity for students to learn how to communicate with each other. Interpersonal skills are developed by the experience of expressing a person's humanity as well as collaborating with others. Drama education's professional organization, the American Alliance for Theatre and Education, has outlined four goals from their model curriculum:

- to develop internal and external personal resources,
- to create drama/theatre through artistic collaboration,
- to relate drama/theatre to its social context,
- to form aesthetic judgements (American Alliance for Theatre and Education, 1987).

Video technology and various applications software are available to assist the theatre experience by offering both the teachers and students choices to improve the delivery of the curriculum. The camcorder can capture the students' participation in theatre. It also is an invaluable tool for assessment as students create portfolios of their best work. Video communication in its own right is a multimedia art form that addresses the interest of the students in all grades. Many students want to be part of the school's news and video programs. Students at the middle and high school level can use application software to help with set design, costuming, computerized lighting and sound control boards. In addition, students use word processing applications for script development and managerial tasks related to the box office.

VISUAL ARTS

The National Art Education Association (NAEA) defines a quality arts experience as one that involves students in a sequential program where students learn the following concepts:

- to develop, express and evaluate ideas,
- to produce, read and interpret visually-oriented world,
- to recognize and understand the artistic achievements and expectations of civilized societies. (Quality Art Education: Goals for Schools, 1986).

Many visual arts programs use a DBAE approach that provides a strong background for all students. As a philosophy of curriculum design Discipline-Based Arts Education (DBAE) creates a framework uniting art production, art history, art criticism and aesthetics as part of the learning experience. Related to art production or performance, technology has produced new learning in the visual arts. After all, designing the graphical look of software is an exercise in visual arts and design. Digital technology has become a vehicle for creative expression as well as a source for arts information. Electronic drawing, computer animation, video digitizing and multimedia activities are parts of many art classes that have the integrated technology in the program. Digital image capture is the combination of many technologies—an easy mix of photography, video, and drawing on a computer. Scanners for computers allow students and teachers to add images to current works.

Computer art applications make it possible to do time consuming tasks while keeping the original work. They can handle some graphics procedures better than the traditional ways before the use of the computer. Newer technology expands the range of opportunities for creative expression in the art classroom by introducing ideas such as *iteration in pattern generation* (repeat tasks) and *morphosis* (ability to gradually change one form to another). Creative possibilities of computer art go beyond imitating traditional media. It also has become a tool for storing art information and managing the everyday classroom activities. Art specialists need to help their students become competent in this powerful art medium.

DANCE

While only 4% of our schools have dance as part of arts education, this discipline is an opportunity for students to understand dance as an art form while recognizing the body as an instrument of creative expression. Curriculum guides created at the national and state level deal with aesthetic perception, kinesthetic sense, creative expression, choreography and dance criticism. Dance can serve both as an art form for perceiving and a language for communicating. It is an opportunity for students to cooperate with others while communicating emotions through movement. Without dance students are denied access to a significant area of human knowledge (Dance Curricula Guidelines K-12, National Dance Association, 1988).

Technology can be incorporated in a variety of ways to assist dance education. It can be used to document and analyze the dynamics of movement. computer-aided choreography gives dance educators the ability to work out ideas of space and movement on screen without bringing the dancers together. Computer software created as a movement notation system allows teachers

and students to create and edit dance notation scores very quickly. And similarly to theatre, sound and lighting technology are part of the dance performances (Robinson and Roland 1994).

Professional Development-Support for Improving Educational Outcomes

Well-trained teachers are the most important part of change and educational improvement. They need preservice training before they enter the classroom and throughout their careers. Just providing the computers and the software will not accelerate arts education. Arts specialists need to have active staff development to develop the knowledge, skills and understanding necessary to relate the newer technologies to the content areas. Teachers realize that technology can change what students will be able to learn; therefore, they need to learn what technology can add to their subject area.

Learning the mechanics of the hardware and software is the first need of educators followed by developing lessons that integrate the technology. Teachers also will learn a new set of instructional strategies moving from a teacher-centered classroom to student-centered learning. In addition, educators who go online can access a wide range of resources, discussion groups and projects. Once arts educators learn how to tap these resources, training becomes easier.

The teachers also need to address meaningful assessment that will validate the success of the learning objectives. Assessment in the arts is a terrific opportunity to use technology to record successful learning experiences by creating a collection or portfolio of best works. Only then can teachers share the evaluation or examples of instruction where technology accelerated the learning or created new artistic opportunities that did not exist before. Powerful staff development provides teachers with classroom assessment skills that allow them to regularly monitor gains in student learning. Inservice opportunities cannot accomplish this task alone.

Teacher training programs require support and time to experiment with the new technologies and develop lesson plans. Arts specialists can learn better and at a lower cost from each other. An arranged mentorship program can assist teachers in collaborating with each other. Inservices for arts specialists that use technology connect teachers to teachers within and beyond their schools; this type of ongoing coaching creates a culture that encourages innovation and collegial sharing of ideas. Only with support and training of teachers will technology support the improvement of educational outcomes for students.

Technology's Impact on Teaching and Learning in Arts Education

Multiple use of WEB technology to thousands of Internet sites can assist with the educational process. Arts specialists can find a wide range of resources, lesson plans, discussion groups and teachers eager to collaborate on various arts projects as well as a dialogue with other art

specialists. Online courses for students and teachers are beginning to appear in virtual high schools and institutions of higher learning. Some states have created online courses aligned with content standards. The Virtual High School Consortium comprised of 43 high schools in 13 states has created high school courses for students and professional development for teachers. The 1999-2000 course schedule lists 7 fine arts courses. One example, *Music Composition and Arranging* has students using computers, music writing and sequencing software, MIDI and keyboards. In addition to the course objectives, the students also will work on collaborative web based musical compositions.

Distance learning exists now in every state. Today this form of telecommunications teaches sophisticated content to high school students through interactive classrooms and online courses. The SC School for the Arts and Humanities insures that its instruction programs, lectures and professional development are available to all students and teachers of the state.

The Massachusetts Institute of Technology is researching new digital techniques for music, dance, storytelling and the visual arts. They feel the students that have become very fluent with the new technologies will be more expressive with those technologies than previous generations. Researchers at MIT believe digital technologies will become extensions of existing tools artists of today use; they will provide a wider range of expressiveness.

Yet we need more research on the use of technology in arts education. We need the active effort of the federal government to keep the momentum going by continued investment in educational technology, effective use of technology in outstanding programs and improved professional development. More long term research studies with empirical evidence are also needed so we can study the findings and recommendations that address the effectiveness and impact of technology integration. Positive assessment will establish accountability and validate future expenditures.

Improving Educational Outcomes

Experiences integrated with technology not only have students create new products and performances, but they also develop computer literacy in students by helping them be better producers and consumers of technology. An arts program that develops students' potential for innovation in music, animation, graphics and multimedia prepares students for the job market of today. Arts specialists must discover the educational vision behind each of the digital technology teaching tools as they integrate the technology with national and state standards, instructional strategies and assessment.

Robinson and Roland (1994) offer four positive outcomes for students as they integrate technology with music, theatre, the visual arts and dance. Students who experience technology

with the arts interact with new modes of artistic expression, and they have a better understanding of the present technological age while developing computer literacy. The teachers develop students' potential for the job market and assist students in keeping their aesthetic sensibilities in the face of technological advances.

Arts specialists have always advocated active participation as a key component for effective learning. Now we see an increasing number of educators using computers to teach music, drama, dance and visual arts. Some of the best learning experiences come when students are involved in designing and creating; yet our lock step curriculum has limited these worthwhile experiences. Now digital technology no longer confines arts experiences to limited interaction; it extends opportunities in types, time, and access to more resources. The students who effortlessly use the new technologies of today are more able to use them for creative expression as the world becomes their classroom.

Technology also changes what students are able to learn. Before educators have distinguished between schoolwork and homework. Now when the computer is on, students can learn at the same intensity at home as well as at school. Students are free to move through the curriculum according to their own pace with periodic assessment. Because all students do not learn the same way or at the same time, they will progress through the curriculum while becoming independent learners.

Connections to Other Schools, Higher Education, Businesses and Communities

With new technologies, communities extend beyond neighborhoods or school attendance areas to include anyone interested in certain topics or issues. Students are virtually connected to people interested in the arts as well as the entire arts community through electronic networks. Technology is giving parents, other schools, higher education, businesses and communities the opportunity to become more involved in students' education. Students can communicate with others as easily as if they were physically present in the school building.

Museums are placing their whole collections on line and using technology to assist with art analysis and discussion. The Guggenheim created a digital production studio with the ability to send the short videos out over the WEB. An interactive music learning center for children has opened in New York City where young people plug in their hand held instrument boxes into a computer system demonstrating rhythm and pitch. Many of the recent arts education grants from the National Endowment for the Arts have technology components attached to their goals.

Distance learning can also be a link for course delivery and communication among different members of communities. Distance learning refers to learning situations in which the instructor

and learner are separated by time and space. By using this example of electronic networks, arts specialists can use people not in the classroom as part of the instructional delivery.

Communications technologies require changes to the traditional classroom structure. Distance learning for K-12 very often relies on the problem solving expertise of both higher education and the industrial world. In addition, community involvement can be part of the learning experience allowing unlimited learner access to programs of choice. The same technologies that allow for universal access to learning also foster a growing sense of community.

CAUTION CONCERNING TECHNOLOGY'S USE

Because technology will play such a key role in job opportunities for the future the uneven distribution of technology based on income, gender, race or geography could widen the social divisions that exist in our society today. Computers have the ability to create a more equitable learning environment in which all students can access the Internet, telecommunications and multimedia resources. We must be aware of equity related to distribution, training and access and create multiple strategies to make sure access to technology exists for all students.

As teachers work with integration of technology to the arts disciplines, it is important to keep the curriculum, instruction and assessment in focus. The most successful application of technology will be combining the best learning theories and instruction with digital methods. The instructional programs for students and teachers cannot be overshadowed by the technology. In other words, the technology cannot become more important than the arts content or curriculum. In addition, teachers and students need to learn to deal with the chaotic information that exists so they may become wise consumers of information technology.

CONCLUSION

Our society is changing from an industrial age model to one immersed in technology, and our schools are beginning to adapt to this change. Technology is affecting the way we develop curriculum, deliver instruction and assess student learning in arts education. While the content in the arts disciplines is most important, technology in the hands of professional arts educators will provide students more varied and challenging experiences and the ability to work at their own pace. Technology will also provide the resources for students to take charge of their learning.

The potential success of using technology for better learning experiences in arts education rests with the teachers. Arts specialists can choose the way technology integrates with the curriculum, and they are beginning to use technology in various instructional and assessment situations. Arts specialists not only need continued training in basic computer skills, they need professional development in specific hardware and software related to improving the learning experience in each of the arts disciplines.

Educational systems, professional arts organizations and arts specialists should lobby for technology to be part of the arts classroom. As educators, we should also ensure that both preservice and inservice teachers have professional development opportunities that address delivering the curriculum standards, instruction and assessment with technology integrated in each part. It will take all members of the arts education community to prepare our students to become performers and consumers of the arts while realizing the lifelong benefits.

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